ABSTRACT OF THE DISCLOSURE

An electric discharge, narrow band gas laser with improvements in wavelength stability. Improvements result from reduced laser beam directional fluctuations or fast correction of those fluctuations. Applicant has discovered, using an extremely sensitive knife edge optical technique, that gas discharge laser windows in a trapezoidal configuration were causing slight wavelength perturbations when laser gas density varied during laser operation. The optical technique involves using test laser beam directed through the discharge region of the gas discharge laser, blocking a portion of the beam with a knife edge and measuring the non-blocked portion of the beam to monitor beam deflection. With this technique, Applicant can measure beams deflection with an accuracy of about 0.3 microradians and with a time response of about 1 microsecond. An improvement in wavelength stability is achieved by orienting the laser chamber windows parallel to each other at a selected angle between 40^{o} and 70^{o} with the laser beam direction. The change eliminates wavelength fluctuations caused by laser beam direction fluctuation caused pressure fluctuations and the prism effect resulting from windows mounted in a prior art trapezoidal configuration. Beam directional fluctuations can also be measured during laser operation using the knife edge technique or similar fast response techniques such as a quadrant detector and the measured values can be used in a feedback arrangement along with fast wavelength control unit to compensate for changes in beam direction. In addition techniques for reducing the causes of beam direction fluctuations are disclosed. These include techniques for minimizing the effects of laser discharge caused pressure waves.